

CLOTHING FOR CONTACT SPORTS**Patent number:** WO9009218**Publication date:** 1990-08-23**Inventor:** FOLEY RICHARD CHARLES JOHN [GB]; SMITH KENNETH ROWLAND [GB]**Applicant:** FOLEY RICHARD CHARLES JOHN [GB]; SMITH KENNETH ROWLAND [GB]**Classification:**- **international:** A63B71/06- **european:** A63B69/00K; A63B69/02; A63B71/06B**Application number:** WO1990GB00253 19900215**Priority number(s):** GB19890003591 19890216**Also published as:**

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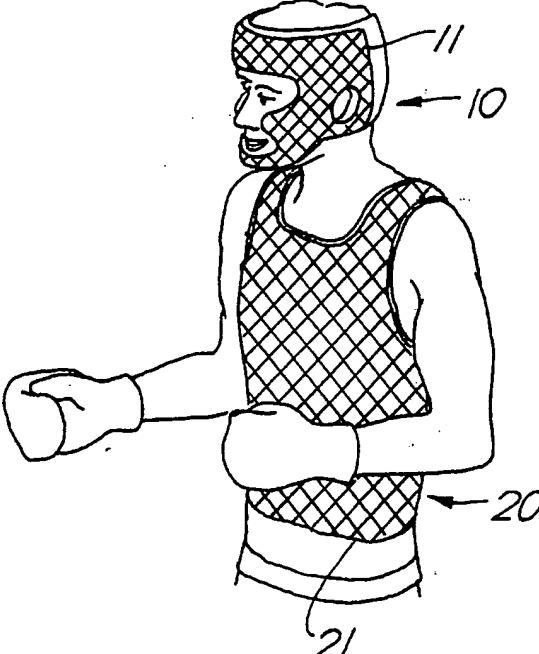
Abstract of corresponding document: **GB2246078**

An item of clothing (10, 20) for use in contact sports, characterised in that it comprises a foundation garment (10, 20) onto which is attached one or more pressure sensitive devices (11, 21) that output a signal when they are hit by a blow delivered with a force that is at least equal to a threshold force.

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<p>(21) International Application Number: PCT/GB90/00253 (22) International Filing Date: 15 February 1990 (15.02.90)</p> <p>(30) Priority data: 8903591.9 16 February 1989 (16.02.89) GB</p> <p>(71)(72) Applicants and Inventors: FOLEY, Richard, Charles, John [GB/GB]; Patience Cottage, 1 & 2 Salisbury Road, Tarrant Hinton, Nr Blandford Forum, Dorset DT11 8HY (GB). SMITH, Kenneth, Rowland [GB/GB]; Canford Heights, 2 Oliver's Road, Colehill, Wimbourne, Dorset BH21 2NT (GB).</p> <p>(74) Agent: WILLIAMS, John, Francis; J.F. Williams & Co., 34 Tavistock Street, London WC2E 7PB (GB).</p>		<p>(81) Designated States: AT, AT (European patent), AU, BB, BE (European patent), BF (OAPI patent), BG, BJ (OAPI patent), BR, CA, CF (OAPI patent), CG (OAPI patent), CH, CH (European patent), CM (OAPI patent), DE, DE (European patent), DK, DK (European patent), ES, ES (European patent), FI, FR (European patent), GA (OAPI patent), GB, GB (European patent), HU, IT (European patent), JP, KP, KR, LK, LU, LU (European patent), MC, MG, ML (OAPI patent), MR (OAPI patent), MW, NL, NL (European patent), NO, RO, SD, SE, SE (European patent), SN (OAPI patent), SU, TD (OAPI patent), TG (OAPI patent), US.</p> <p>Published With international search report.</p>	
<p>(54) Title: CLOTHING FOR CONTACT SPORTS</p>  <p>The diagram shows a person from the waist up, wearing a protective vest and a headgear. The vest has a textured pattern. Two arrows point to specific areas: one arrow labeled '10' points to the vest, and another arrow labeled '20' points to the waistband. A third arrow labeled '21' points to the headgear. The person is in a dynamic pose, suggesting movement.</p>			
<p>(57) Abstract</p> <p>An item of clothing (10, 20) for use in contact sports, characterised in that it comprises a foundation garment (10, 20) onto which is attached one or more pressure sensitive devices (11, 21) that output a signal when they are hit by a blow delivered with a force that is at least equal to a threshold force.</p>			

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Clothing for Contact Sports

The present invention relates to clothing for contact sports and in particular to clothing that aids scoring during training and competitions.

5 In contact sports such as boxing, Thai boxing and Karate to score a point in competition it is necessary to deliver a blow with sufficient force to a specified region of the opponent's body. Both criteria are judged visually by judges who decide whether a particular blow is worthy 10 of a score. This process is subject to a degree of human error. The present invention seeks to produce an accurate, automatic method of scoring for such contact sports.

15 According to a first aspect of the invention there is provided an item of clothing for use in contact sports, characterised in that it comprises a foundation garment onto which is attached one or more pressure sensitive devices that output a signal when they are hit by a blow 20 delivered with a force that is at least equal to a threshold force.

In a preferred embodiment all of the pressure sensitive devices output in response to the same common threshold 25 force.

In an alternative preferred embodiment there are a plurality of pressure sensitive devices, one or more of which outputs in response to a first common threshold force and one or more of which outputs in response to 30 a second common threshold force.

According to a second aspect of the invention there is provided a method of scoring for contact sports comprising the steps of, mounting pressure sensitive devices on the parts of the competitor's bodies where scoring blows can be delivered, monitoring output signals from the pressure sensitive devices, and registering as scoring blows only those blows which are delivered with a force in excess of a threshold force, or between upper and lower pre-determined limits of force.

In order that the invention and its various other features may be understood more easily, an embodiment thereof will now be described with reference to the drawings, wherein:-

Fig. 1. shows the scoring areas for a contact sport such as boxing;

Fig. 2. shows the invention incorporated into a vest and a helmet;

Fig. 3. shows the transmission and/or counting means associated with the helmet in Fig. 2.

Fig. 4. shows the transmission and/or counting means associated with the vest in Fig. 2.

The invention comprises an item of clothing 10,20 incorporating pressure sensitive pads 11,21 which send a signal or signals to a counter system 30,31. Fig. 1. shows the scoring areas for boxing, which are the face 12 and the torso 13. Blows to these areas are measured

by pressure pads 11,21 mounted on a vest 20 or on a helmet 10.

5 In a first embodiment of the invention the pressure pads comprise one or more identical pressure sensors which send a signal to the counter system only when they are hit by a blow delivered with a force equal to or in excess of a chosen threshold force so that only hard scoring blows are counted.

10 A variety of pressure sensors are suitable for this application. They may be analogue devices that give a constant output that is proportional to the applied pressure that are allied with a conditioner that sends a signal to the counter system only when the measured pressure reaches that corresponding to the threshold force. Two suitable types of sensor are described in British Patent Application 2 194057A and British Patent 1585 441. Any other device that produces an electrical 15 signal in response to a blow may be used such as piezo-electric devices and air pressure operated switches.

20 A preferred sensor is of the type of membrane switch used in certain types of electronic keyboard. Two flexible membranes are separated by a thin perforated insulated separator. The inner surfaces of the membranes are coated with conductive strips so that when a force at least as great as the threshold force is applied to the membranes they will touch through the 25 perforations in the area where the force is applied. This forms a circuit and sends a signal to the counter system 30,31.

The counter system 30,31 may be worn adjacent to the garment. For boxing each of the pugilists has a counter on his helmet 30 and on his waist 31 (Fig. 3 & Fig.4). After a bout the cumulative total of scoring blows landed by each competitor is read from the counters.

A second embodiment of the invention is similar to that already described but uses pressure sensors that send a signal to the counter system only when a blow is delivered with a force that is between a maximum and minimum threshold force. This embodiment may be used to prevent competitors scoring with excessively hard, dangerous blows. Additionally, an alarm may warn the referee when a blow is delivered with a force in excess of the upper threshold force. Any of the pressure sensors already described may be used but analogue sensors require a more sophisticated conditioner discriminator that sends a signal only when the measured pressure is between the corresponding threshold force limits.

A preferred type of sensor is a variation of the membrane switch already described in which the perforations in the separator are of two different sizes. The membrane in the area above the larger perforations will be more flexible than that above the smaller perforations, so that at the larger perforations contact will be made at the lower threshold force and at the smaller perforations only at the higher threshold force. The arrangement of the conductive strips on the membranes is such that the two signals are kept separate and the counter system is designed to count a blow on

receipt of the lower threshold force signal except if it simultaneously receives the higher threshold force signal.

5 Both embodiments of the invention provide accurate and reliable means of judging for contact sports; the scoring garments are light and unobtrusive and the second embodiment makes contact sports less dangerous by detecting and penalising excessively heavy blows.

10 An alternative to the counter system described 30,40 is a remote counter system. In place of the described counters worn on the pugilists' waists 31 and helmets 30 transmitter units are used that send radio, microwave, 15 ultra sonic or infra red signals to one or more receivers located around the combat area that are in turn connected to a counter unit.

20 The device can be used for teaching unarmed combat to police or military personnel.

25 The device can also be used for other sports where an exact knowledge of physical contacts is desirable such as in the training of cricket bowlers and in indoor soccer training.

The device can in addition be used in medical research to evaluate the effect of blows of known force on the body.

Claims

1. An item of clothing (10,20) for use in contact sports, characterised in that it comprises a foundation garment (10,20) onto which is attached one or more pressure sensitive devices (11,21) that output a signal when they are hit by a blow delivered with a force that is at least equal to a threshold force.
5
2. An item of clothing (10,20) according to claim 1, wherein one or more of the pressure sensitive devices (11,21) comprises two initially separated membranes having electrical conduction means formed thereon, the membranes contacting one another when a force at least equal to the threshold force is applied to one of the membranes, thereby forming an electrical circuit between the membranes and outputting a signal.
10
15
3. An item of clothing (10,20) according to claims 1 or 2, wherein the foundation garment is either a vest (20) or a helmet (10).
20
4. An item of clothing (10,20) according to any preceding claim, wherein all of the pressure sensitive devices (11,21) output in response to the same common threshold force.
25
5. An item of clothing (10,20) according to any of claims 1 to 3 comprising a plurality of pressure sensitive devices (11,21), one or more of which outputs in response to a first common threshold force, and one or more of which outputs in response to a second common threshold force.
30

6. A scoring system for contact sports, comprising an item of clothing (10,20) according to claim 4, and counting means (30,31) connected to the pressure sensitive device(s) (11,21) for recording the number of 5 blows delivered to the pressure sensitive device(s) with a force at least equal to the threshold force.

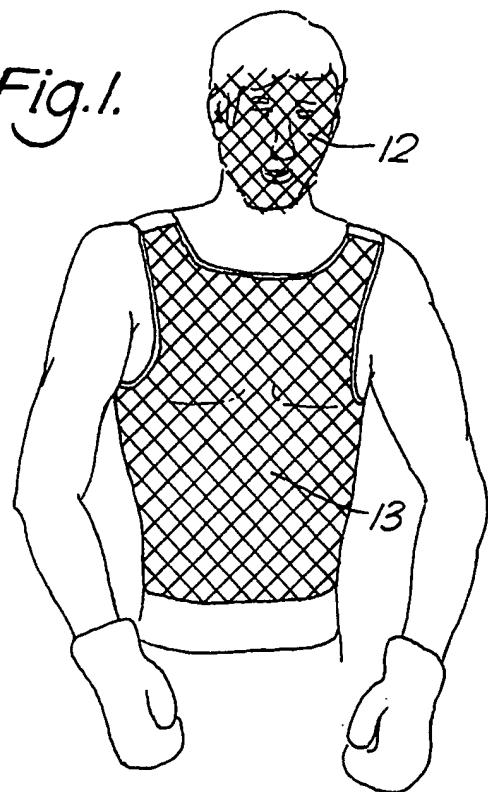
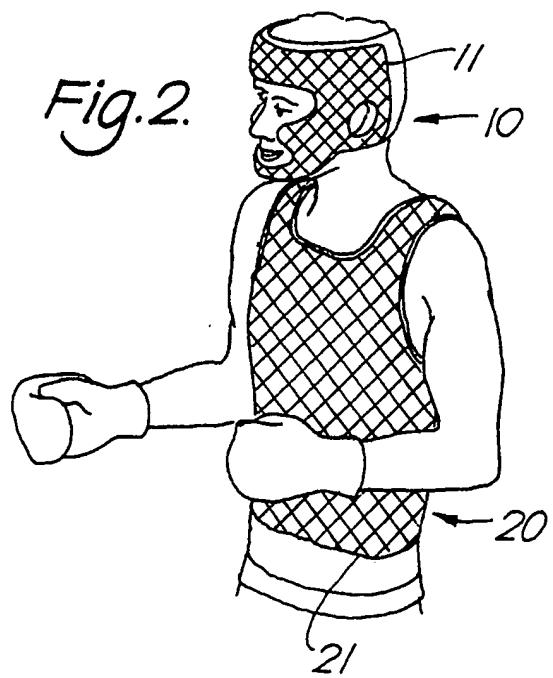
7. A scoring system for contact sports, comprising an item of clothing (10,20) according to claim 5, and 10 counting means (30,31) connected to the pressure sensitive device(s) (11,21) for recording the number of blows delivered to the pressure sensitive devices with a force equal to or in excess of the first common threshold force, but not in excess of the second common 15 threshold force.

8. A scoring system according to claim 6 or 7, wherein the counting means (30,31) further comprises alarm means which are activated when a blow is delivered 20 to a pressure sensitive device (11,21) with a force in excess of the second common threshold force.

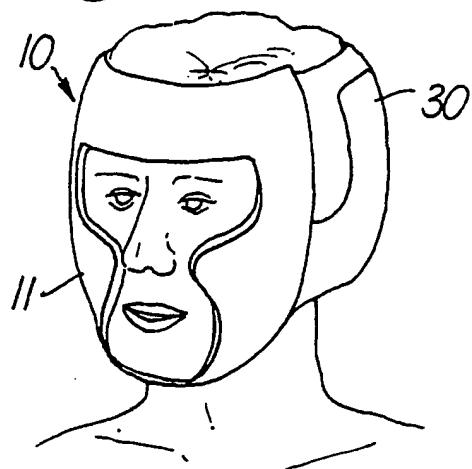
9. A scoring system according to any of claims 6 to 25 8, wherein the counting means (30,31) are mounted on the foundation garment (10,20).

10. A method of scoring for contact sports comprising
the steps of, mounting pressure sensitive devices
(11,21) on the parts (12,13) of the competitor's bodies
where scoring blows can be delivered, monitoring
5 output signals from the pressure sensitive devices, and
registering as scoring blows only those blows which
are delivered with a force in excess of a threshold
force, or between upper and lower pre-determined limits
of force.

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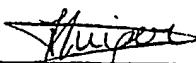
Fig.1.*Fig.2.*

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Fig.3.*Fig.4.*

INTERNATIONAL SEARCH REPORT

International Application No. PCT/GB 90/00253

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁶ According to International Patent Classification (IPC) or to both National Classification and IPC IPC5: A 63 B 71/06		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁷		
Classification System	Classification Symbols	
IPC5	A 63 B; A 41 D	
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III. DOCUMENTS CONSIDERED TO BE RELEVANT⁹		
Category	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
X	FR, A1, 2612411 (FERNANDEZ, S ET AL) 23 September 1988, see the whole document --	1-4
X	SE, B, 406157 (JEPSSON, N ET AL) 29 January 1979, see claims 1-5 --	1-2, 4
X	DE, A1, 2631000 (AUSTRALASIAN TRAINING AIDS PTY. LTD.) 20 January 1977, see especially claims 1-6 --	1-2, 4-8
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IV. CERTIFICATION		
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
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A	DE, A1, 3347197 (LICENCIA TALAMANYOKAT ERTEKESITÖ VALLALAT) 4 July 1985, see the whole document --- -----	1-9

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)		
Category *	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No
A	DE, A1, 3347197 (LICENCIA TALAMANYOKAT ERTEKESITÖ VALLALAT) 4 July 1985, see the whole document -----	1-9

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